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minutes of the previous meeting were read and approved. The following persons were nominated for membership in the Academy: Mr. Maurice A. Bigelow, of Teachers College; Dr. Edward L. Thorndike, of Teachers College, Mr. R. S. Woodworth, of University and Bellevue Hospital Medical College, and Dr. W. Golden Mortimer, 504 W. 146th Street, New York City.

The evening was devoted to reports of the past summer's work by a number of members.

Professor H. F. Osborn gave an account of the exploration by the American Museum party in the Como beds of Southern Wyoming, and of further work in the Bone Cabin Quarry, which resulted in the discovery of a large number of the remains of Dinosaurs. Four miles distant a *Brontosaurus* skeleton was found. Parties were also sent to the Freeze Out Mountains and north to the Rattlesnake Mountains, but without success.

Professor E. B. Wilson reported upon his search in Egypt for *Polypterus*, which resulted in the obtaining of a few fine females, but with unripe ovaries; this was in winter, between Assuan and Mansourah. Professor Wilson reported, also, the rediscovery by him of the gill-bearing earthworm, *Alma*.

Professor Bashford Dean reported on the work of the second Senff expedition to the Nile, and spoke of the death of Nathan Russell Harrington, the senior member of the party. Mr. Harrington had for four years identified himself with the Biological Section, and had left with it an enviable example of energetic and persistent effort to complete an important research and of sacrifice and devotion to a life work.

Professor Dean further reported on his work on the California coast while a guest of Stanford University. He was successful during the present summer in obtaining a number of freshly hatched young of *Bdellostoma*, and many developmental stages of *Chimaera Colliei*.

Dr. G. N. Calkins reported the passing of a successful summer at the Marine Biological Laboratory at Woods Hole, where he was at work upon the Protozoa.

Professor F. E. Lloyd gave a brief account of a collecting trip in Vermont, embodying some remarks upon certain species of *Lycopodium* found there. He also reported upon the marked

success of the Biological Laboratory at Cold Spring Harbor during the summer.

Professor F. S. Lee spoke on the continuation of his experimental work upon the lateral line in fishes, conducted at Woods Hole.

FRANCIS E. LLOYD,
Secretary.

DISCUSSION AND CORRESPONDENCE.

'THE PERCEPTION OF HORIZONTAL AND OF VERTICAL LINES.'

TO THE EDITOR OF SCIENCE: In connection with Professor Peirce's article on 'The Perception of Horizontal and of Vertical Lines' (SCIENCE, September 29, 1899), it may be appropriate to call attention to a study of the same question made in the Psychological Laboratory of the University of Wisconsin and published in the *American Journal of Psychology* in 1893 (Vol. V., pp. 214-223). Our method consisted in seating the observer under a parasol-like canopy, which completely screened from him all the horizontals and verticals of floor and walls; in then placing opposite him under the canopy a large black disc, upon which was centered a smaller white disc bearing upon it a single line; and in requiring the observer to set this line (by means of strings manipulated by his hands which were outside the canopy) so that it appeared horizontal or vertical. The observer is thus everywhere surrounded by curved outlines, and has no standard to guide him except the ideal one which he carries in his mind. So far as the results of the two investigations are comparable they agree very well, both emphasizing the great accuracy of such 'mental' judgments. Our estimations were made binocularly under circumstances approximating those of the ordinary use of the eyes; Professor Peirce's subjects in the first group of experiments used each eye separately. If we may assume that the average setting of the two eyes used separately is equivalent to the binocular setting of the lines, and further allow that the two methods used are fairly comparable, we find for the mean deviation for Professor Peirce's subjects (average of ten subjects) for the horizontal $+ .25^\circ$, for my ten subjects $+ .12^\circ$; for the vertical $-.39^\circ$ and $+ .23^\circ$. It is better, however, to compare my results with Professor

Peirce's binocular results obtained by looking through a tube 35 centimeters in diameter and 2 meters long. The mean deviation for the horizontal then becomes (average of 29 subjects) — .25° and for the vertical — .56°. The settings are so nearly correct that the direction of the error cannot be regarded as significant; in both sets of observations the excess in number of those who tended to one type of error was not very great upon those who tended to the contrary type. I also investigated the errors for oblique settings. These proved to be much greater, on the average about nine times as large, and with a pronounced tendency to set both the oblique lines in a position nearer the horizontal than the two 'ideal' oblique lines making angles of 45° with the horizontal and vertical.

In the same group of contributions from the Laboratory of the University of Wisconsin may also be found a study of the accuracy with which lines could be set in given positions, when a model or copy was furnished; and a study of the accuracy with which angles may be reproduced.

The variations in the manner of estimating which Professor Peirce has introduced are extremely interesting and contribute something of value to the determination of the factors which influence such judgments of position. I can recall that at the time we were engaged in these investigations, I had in contemplation a set of experiments in which the subject should be required to set vertical and horizontal lines in a room in which contained no true verticals or horizontals or rectangular dimensions. The floor was to be slightly out of the horizontal in one direction, the ceiling in another, while the walls might present various kinds and degrees of divergence from the vertical. How far such an unusual environment might effect one's estimate of the true horizontal and vertical seems an interesting subject of inquiry.

JOSEPH JASTROW.

PSYCHOLOGICAL LABORATORY, UNIVERSITY OF WISCONSIN, MADISON, WIS., October 5th.

THE THIRD PRINCETON EXPEDITION TO PATAGONIA.

MR. J. B. HATCHER and his assistant, Mr. O. A. Peterson, have returned from their third exploration of Patagonia, where they were sent

by the Geological Department of Princeton University. The work has been highly successful and admirably supplements that of the two previous journeys. We hope to give later a more detailed report of the results of the expedition, but may state at present that the party sailed from New York on December 9, 1898, and returned August 17, 1899, bringing very extensive collections of both vertebrate and invertebrate fossils of Patagonia, together with much material illustrating the zoology and botany of that region. The work of cleaning and preparing these great collections for study and publication has already made good progress, and is being pushed forward as rapidly as possible.

In a recent report Mr. Hatcher summarized the results of the work for the last three years as follows:

"(1) A good preliminary geological survey of that part of southern South America, lying between the Andes on the west and the Atlantic on the east, and between the Straits of Magellan and the forty-seventh parallel of south latitude, sufficient to serve as a basis for a geological map of the region.

"(2) Very extensive and complete collections of fossils from all the different fossil-bearing horizons known to that region, with the one exception of the *Pyrotherium* beds.

"(3) The discovery of four distinct and previously unreported geological horizons.

"(4) A collection of more than one thousand skins and skeletons of recent birds and mammals, embracing about one hundred and fifty species of birds and fifty species of mammals, and fairly representative of the mammalian and avian life.

"(5) Extensive collections of the fresh water, terrestrial and littoral invertebrate life.

"(6) Botanical collections, especially of the mosses, *Hepaticæ* and flowering plants, not including the grasses and sedges."

(7) To the above should be added a large and very valuable series of photographs, illustrating the geology and physical geography of Patagonia.

It is hoped that a series of adequately illustrated monographs will be issued from the Princeton museum containing the results of the